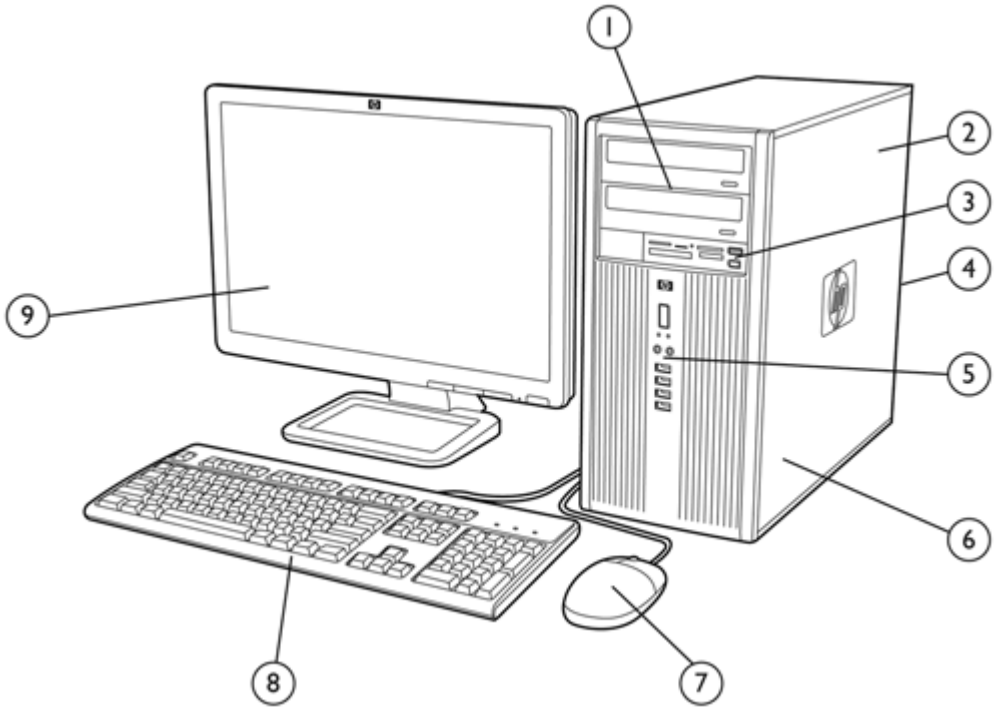
Overview

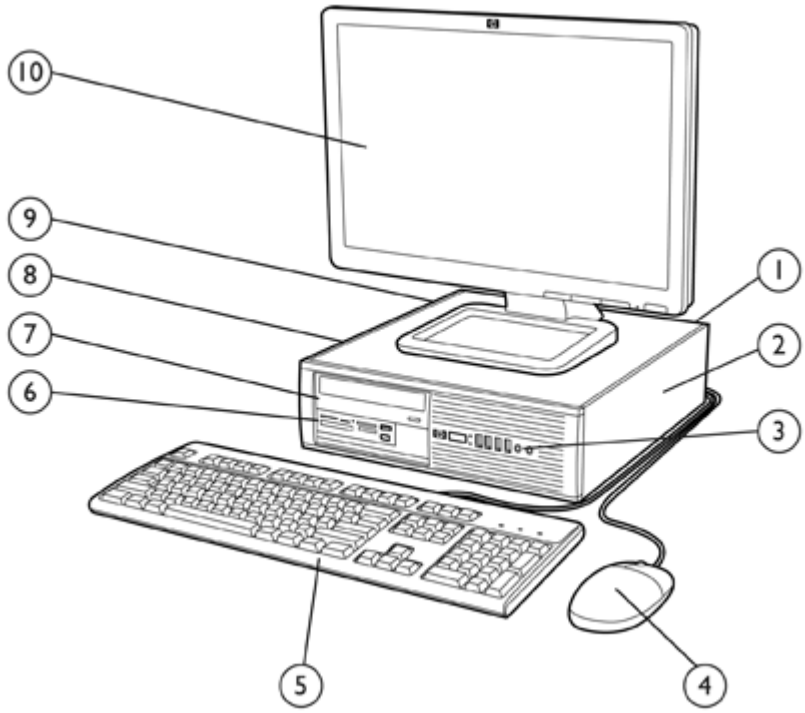
Microtower



1. (2) 5.25" external optical disk drive bays
   (2) 3.5" internal hard disk drive bays
2. 320-watt standard efficiency power supply, Active Power Factor Correction (PFC)
   Optional: 89% efficient energy saving power supply
3. (1) 3.5" external bay for optional HP 22-in-1 Media Card Reader, pocket media drive, or other 3.5" device
4. Rear I/O: (6) USB 2.0, (1) standard serial port, (1) optional serial port, (1) optional parallel port, (2) PS/2, (1) RJ-45, (1) VGA, (1) audio in, (1) audio out, (1) Display Port
5. Front I/O: (4) USB 2.0, headphone and microphone, Dual Color Diagnostic LEDs
6. (1) full-height PCI slot, (2) full-height PCIe x1 slots, (1) full-height PCIe x16 slot
7. HP Optical Scroll Mouse (PS/2 or USB), or HP USB Laser Mouse
8. HP Standard Keyboard (PS/2 or USB) or HP USB Smartcard Keyboard
9. HP monitor (sold separately)

Overview

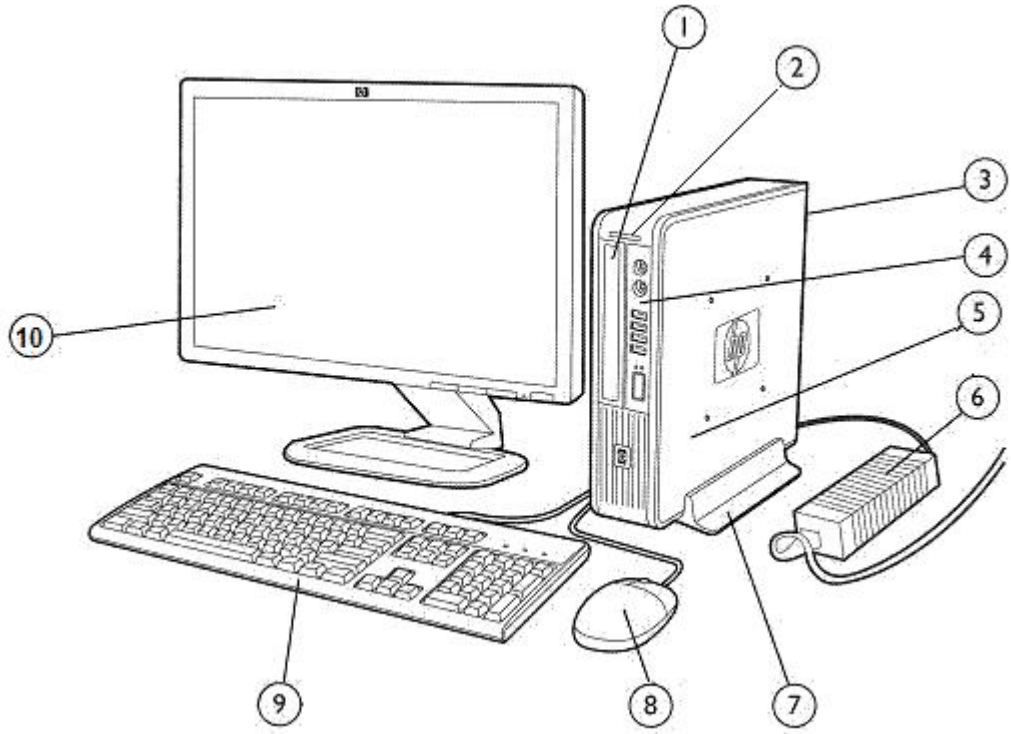
Small Form Factor



1. Rear I/O: (6) USB 2.0, (1) standard serial port, (1) optional serial port, (1) optional parallel port, (2) PS/2, (1) RJ-45, (1) VGA, audio in/out , (1) DisplayPort
2. (1) low profile PCI slot, (2) low profile PCIe x1 slots, (1) low profile PCIe x16 slot
3. Front I/O: (4) USB 2.0, headphone and microphone, Dual Color Diagnostic LEDs
4. HP Optical Scroll Mouse (PS/2 or USB), or HP USB Laser Mouse
5. HP Standard Keyboard (PS/2 or USB) or HP USB Smartcard Keyboard
6. (1) 3.5" external bay for optional HP 22-in-1 Media Card Reader, pocket media drive, or other 3.5" device
7. (1) 5.25" external bay for optional optical drive, or other 5.25" device (bay tilts up for device removal and insertion)
8. (1) 3.5-inch internal drive bay supporting primary hard disk drive
9. 240-watt standard efficiency power supply
   Optional: 89% efficient energy saving power supply
10. HP Monitor (sold separately)

Overview

Ultra-Slim Desktop



1. Optical Disc Drive
2. Optional Secure Digital (SD) Card Reader
3. Rear I/O: (6) USB 2.0 ports, DisplayPort and VGA video interfaces, PS/2 mouse and keyboard ports, RJ-45 network interface, audio in/out jacks
4. Front I/O: (4) USB 2.0 ports, dedicated headphone output, and a microphone/headphone jack
5. (1) 2.5" internal hard disk drive bay
6. 135W 87% efficient external Power Adapter
7. HP USDT Tower Stand (sold separately)
8. HP Optical Mouse
9. HP Keyboard
10. HP Monitor (sold separately)

Overview

At A Glance

- The HP Compaq 6005 Pro Business PC is a high performance PC with energy efficient features designed to exceed expectations and deliver results without compromise
- AMD 785G chipset with integrated ATI Radeon HD 4200 graphics supporting DirectX 10.1
- Side Port Memory for increased power savings and increased graphics performance
- Standard dual display support (DisplayPort and VGA)
- AMD Phenom™ II Quad-Core, Triple-Core, and Dual-Core processors; AMD Athlon™ II Dual-Core processors; AMD Sempron™ processor; all processors with AMD-V support
- Embedded TPM1.2 compliant security module* (Vista Bit-Locker ready)
- Support for up to 500-GB SATA 3.0Gb/s Smart IV hard drives
- Value-added software on select models
  - HP Support Assistant
  - HP Software Agent
  - McAfee Anti-Virus with 60 day Live Update Subscription
  - HP Vision Diagnostics software
  - Microsoft Office 2007
  - PDF Complete
  - Computrace Enabler for Desktops (select countries)
  - HP System Software manager
  - HP Power Assistant
  - Firefox- HP Virtual Browser
- Value-added software available for free download from the Web (http://www.hp.com/go/easydeploy)
  - HP Client Automation Starter **
  - HP SoftPaq Download Manager
  - HP System Software Manager
  - HP Client Catalog for Microsoft SMS
- Fully compatible software OS image across all models (Microtower, Small Form Factor)
- HP BIOS for security, manageability and software image stability
- Protected by HP Services, including standard warranties up to 5-5-5 (terms and conditions vary by country; certain restrictions and exclusions apply)
- Selected configurations with global availability easily set up and ordered through HP.com Business to Business portals (http://h10019.www1.hp.com/business-site/index.html)
- Tailored HP Factory Express deployment and lifecycle services available (http://h71028.www7.hp.com/enterprise/cache/97688-0-0-225-121.aspx)

*TPM module disabled where use is restricted by law; for example, Russia.
** Available from HP Sales Representative or HP Channel Partner.

Standard Features and Configurable Components (availability may vary by country)

Operating System – One of the following	Preinstalled	Genuine Windows 7 Professional Edition 32* Genuine Windows 7 Professional Edition 64* Windows XP Professional (available through downgrade rights from Genuine Windows 7 Professional)*+ Genuine Windows 7 Home Premium Edition 32* Genuine Windows 7 Home Premium Edition 64* Genuine Windows 7 Home Basic Edition 32* Genuine Windows Vista Business 32** Genuine Windows Vista Home Basic 32** Windows XP Professional (available through downgrade rights from Genuine Windows Vista Business)**++ Novell SUSE Linux Enterprise Desktop 11† FreeDOS
	Supported	Genuine Windows Vista Business 64** Genuine Windows Vista Enterprise 32** Genuine Windows Vista Enterprise 64**
	Certified	Novell SUSE Linux Enterprise Desktop 11† Red Hat Enterprise Linux††

NOTE: Windows XP Mode, available as a separate download for Windows 7 Professional, works with virtualization software such as Windows Virtual PC to run older Windows XP business software on the Windows 7 desktop.

* Offered when Windows 7 is generally available. System may require upgraded and/or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality.
See http://www.microsoft.com/windows/windows-7/ for details.

** Certain Windows Vista product features require advanced or additional hardware. See: http://www.microsoft.com/windowsvista/getready/hardwarereqs.mspx and: http://www.microsoft.com/windowsvista/getready/capable.mspx for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor.

+ Windows 7 Professional disk may also be included for future upgrade if desired. To qualify for this downgrade an end user must be a business (including governmental or educational institutions) and is expected to order annually at least 25 customer systems with the same custom image.

++ Windows Vista Business disk may also be included for future upgrade if desired. To qualify for this downgrade an end user must be a business (including governmental or educational institutions) and is expected to order annually at least 25 customer systems with the same custom image.

† The following features are not supported by Novell SUSE Linux Enterprise Desktop:

- HP 22-in-1 Media Card Reader with PCI Card
- HP ProtectTools
- SATA Blu-ray Writer playback of commercial movies
- Broadcom NetXtreme Gigabit Ethernet PCIe NIC Plus Card (DASH functionality)
- HP 802.11b/g/n Wireless PCIe x1 Half Mini Card
- HP TV Tuner Mini PCIe Card
- 2nd serial port adapter (including low profile)

Standard Features and Configurable Components (availability may vary by country)

- Power Management features (US ENERGY STAR)

†† The following features are not supported by Red Hat Enterprise Linux:

- HP 22-in-1 Media Card Reader with PCI Card
- Integrated 1.2 TPM Embedded Security Chip
- Broadcom NetXtreme Gigabit Ethernet PCIe NIC Plus Card (DASH functionality)
- LSI PCEe x1 Hi-Speed 56K International SoftModem
- HP FireWire / IEEE 1394 PCI Card (full height and low profile)
- 2nd serial port adapter (including low profile)
- HP 802.11b/g/n Wireless PCIe x1 Card
- HP 802.11b/g/n Wireless PCIe x1 Half Mini Card
- HP TV Tuner Mini PCIe Card
- HP USB Smartcard Keyboard
- Power Management features (US ENERGY STAR)

Value-added Software (on select models; not included with FreeDOS)

HP Software Agent	Microsoft Office 2007 Basic
HP Support Assistant	Microsoft Office 2007 Personal
HP Systems Software Manager	Microsoft Office 2007 Professional
HP Vision Diagnostics	Microsoft Office 2007 Small Business Edition
HP Power Assistant	Integrated DASH 1.1 Manageability
McAfee Total Protection Anti-Virus with 60 day trial Subscription	Computrace Enabler for Desktops (select countries)*
Roxio Creater Business (select models)	HP Skyroom (trial version)
Firefox-HP Virtual Browser	Corel WinDVD (select models)
SRS Premium Sound Software for HP Thin USB Powered Speakers (select models)	Norton Online Backup

* Requires HP LoJack Pro for ProtectTools for full functionality. Tracking and tracing subscription sold separately.

Value-added Software (available for free download from the Web http://www.hp.com/go/easydeploy)

HP Client Automation Starter*	HP Client Catalog for Microsoft SMS
HP Client Manager from Symantec	HP Systems Software Manager
HP SoftPaq Download Manager	HP Disk Sanitizer, External Edition

* Available from HP Sales Representative or HP Channel Partner.

Value-added Services and Features

HP Stable Platform Program	Factory Express Deployment and Lifecycle Services
Business-to-Business Portals	TPM 1.2 Security chip*
HP Global Series Services	

* TPM module disabled where use is restricted by law; for example, Russia.

Standard Features and Configurable Components (availability may vary by country)

Service and Support

On-site Warranty and Service Note 1: This limited warranty and service offering delivers parts, labor and on-site repair for terms up to 5 years. Response time is next business-day Note 2 and includes free telephone support Note 3 24 x 7. Global coverage Note 2 ensures that any product purchased in one country and transferred to another non-restricted country will remain fully covered under the original warranty and service offering. Some countries/regions do not offer one year onsite and labor. For HP Care Pack services see: http://www.hp.com/go/lookuptool.

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply.

NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

NOTE 3: Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

	Microtower	Small Form Factor	Ultra-Slim Desktop
Chassis Dimensions (H x W x D)	14.85 x 6.95 x 16.96 in 377.2 x 176.5 x 430.8 mm	3.95 x 13.30 x 14.90 in 100.3 x 337.8 x 378.5	2.6 x 9.9 x 10 in 66 x 251.5 x 254 mm
Optional Tower Stand Dimensions (H x W x D)	N/A	1.05 x 6.95 x 7.83 in (26.75 x 176.46 x 198.87 mm)	1.07 x 4.92 x 6.69 in 27.2 x 124.9 x 169.9 mm
System weight*	20.5 lb (9.3 kg)	16.0 lb (7.26 kg)	6.75 lb (3.07 kg)
System volume	1739 cu in	941.63 cu in	257.5 cu in
Shipping weight*	28.79 lb (13.06 kg)	26.70 lb (12.11 kg)	14.42 lb (6.54 kg)
Maximum supported weight (desktop orientation)	N/A	77.1 lb (35 kg)	77 lb (35 kg)
Shipping box dimensions (H x W x D)	19.69 x 12.2 x 23.62 in 500 x 310 x 600 mm	9.72 x 19.68 x 22.67 in 246.9 x 499.9 x 575.8 mm	8.60 x 15.68 x 19.68 in 218.4 x 398.3 x 499.9 mm

* Configured with 1 hard drive, 1 optical drive, no diskette drive, and no PCI card.

Power Supply	320W power supply – active PFC	240W power supply – active PFC	
Energy Efficient Power Supply	320W 89% efficient power supply – active PFC	240W 89% efficient power supply – active PFC	135W 87% efficient – active PFC

Ports

USB 2.0	10 (4 front, 6 rear)
Serial	1 standard with 2nd optional on MT and SFF; none on USDT
Parallel	1 optional on MT and SFF; none on USDT
PS/2	1 keyboard, 1 mouse
Video	VGA and DisplayPort for integrated graphics
DVI output	available via HP DisplayPort to DVI-D Adapter
Support for Multi-Monitor	1 Standard DisplayPort and 1 Standard VGA
Audio	Integrated High Definition audio with internal speaker Front – mic and headphone Rear – input (supports microphone or line input), line out
NIC (RJ-45)	Integrated Broadcom NetXtreme Gigabit Ethernet BCM 5761

Standard Features and Configurable Components (availability may vary by country)

		MT	SFF	USDT
Chipset	AMD 785G chipset	X	X	X
Processor One of the following	AMD Sempron Processors with HyperTransport™ Technology:			
	AMD Sempron 140 Processor (2.7 GHz, 1 MB L2 cache, HT bus 3.0)	X	X	
	AMD Sempron 145 Processor (2.8 Ghz, 1MB L2 cache, HT bus 3.0)			X
	AMD Athlon II Dual-Core Processors with HyperTransport Technology:			
	AMD Athlon II X2 215 Processor (2.7 GHz, 1 MB L2 cache, HT bus 3.0)	X	X	
	AMD Athlon II X2 220 Processor (2.8 GHz, 2 MB L2 cache, HT bus 3.0)			X
	AMD Athlon II X2 B22 Processor (2.8 GHz, 2 MB L2 cache, HT bus 3.0)	X	X	X
	AMD Athlon II X2 B24 Processor (3.0 GHz, 2 MB L2 cache, HT bus 3.0)	X	X	X
	AMD Athlon II X2 B26 Processor (3.2 GHz, 2 MB L2 cache, HT bus 3.0)			X
	AMD Athlon II X4 605e Processor (2.3 GHz, 2 MB L2 cache, HT bus 3.0)			X
	AMD Phenom II Dual-Core Processors with HyperTransport Technology:			
	AMD Phenom II X2 B53 Processor (2.8 GHz, 1 MB L2 cache, 7 MB Total cache, HT bus 3.0)	X	X	
	AMD Phenom II X2 B55 Processor (3.0 GHz, 1 MB L2 cache, 7 MB Total cache, HT bus 3.0)	X	X	
	AMD Phenom II Triple-Core Processors with HyperTransport Technology:			
	AMD Phenom II X3 B73 Processor (2.8 GHz, 1.5 MB L2 cache, 7.5 MB Total cache, HT bus 3.0)	X	X	
	AMD Phenom II X3 B75 Processor (3.0 GHz, 1.5 MB L2 cache, 7.5 MB Total cache, HT bus 3.0)	X	X	
	AMD Phenom II Quad-Core Processors with HyperTransport Technology:			
	AMD Phenom II X4 910e Processor (2.6 GHz, 2 MB L2 cache, 8 MB Total cache, HT bus 3.0)			
	AMD Phenom II X4 B93 Processor (2.8 GHz, 2 MB L2 cache, 8 MB Total cache, HT bus 3.0)	X	X	
	AMD Phenom II X4 B95 Processor (3.0 GHz, 2 MB L2 cache, 8 MB Total cache, HT bus 3.0)	X	X	

Standard Features and Configurable Components (availability may vary by country)

Memory

Supports un-buffered non-ECC DDR3 SDRAM
AMD processors support un-buffered non-ECC DDR3 SDRAM (synchronous dynamic random access memory) at a frequency of up to 1333 MHz.

NOTE: The actual memory speed for DDR3 SDRAM depends on the processor and memory configuration.

System memory upgrades are accomplished by adding DDR3 SDRAM module(s) to empty DIMM slots on the system board.

CAUTION: Voltage is supplied to the memory modules whenever the computer is connected to an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board. The computer must be shut down with the AC power removed (disconnect AC power cord at rear chassis or at AC outlet) prior to adding or removing SDRAM modules.

HP recommends dual-channel configurations for the best memory performance.
For best performance, add memory to each memory channel and do not inter-mix memory module speeds. If memory module speeds are inter-mixed, the memory operating frequency will default to the slowest speed.

Ultra-slim Desktop

Maximum Memory*

Supports up to 8 GB of DDR3 SDRAM using SO-DIMM modules. Not all memory configurations possible are represented below.

NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements.

SO-DIMM Size	Slot	
	Channel A (black)	Channel B (white)
	1 (white)	2 (white)
1 GB	1 GB	
2 GB (dual channel)	1 GB	1 GB
4 GB (dual channel)	2 GB	2 GB
8 GB (dual channel)	4 GB	4 GB

Microtower and Small Form Factor

Maximum Memory*

Supports up to 16GB of un-buffered non-ECC DDR3 SDRAM.

The DIMM connectors for Channel A slot 3 and Channel B slot 4 are black and these slots must always be populated first in the channel. Not all possible memory configurations are represented in the table below.

Standard Features and Configurable Components (availability may vary by country)

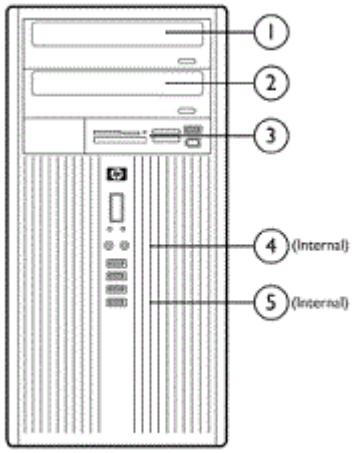
NOTE: For systems configured with more than 3GB of memory and a 32-bit operating system, all memory may not be available to the OS due to system resource requirements. Addressing memory above 4GB requires a 64-bit operating system.

Total Memory	DIMM Slot Population			
	Channel A		Channel B	
	1 (white)	3 (black)	2 (white)	4 (black)
1-GB (Single Channel)				1GB
2-GB (Dual Channel)		1GB		1GB
3-GB (Dual Channel)		2GB		1GB
4-GB (Dual Channel)		2GB		2GB
4-GB (Dual Channel)	1GB	1GB	1GB	1GB
8-GB (Dual Channel)	2GB	2GB	2GB	2GB
16-GB maximum (Dual Channel)	4GB	4GB	4GB	4GB

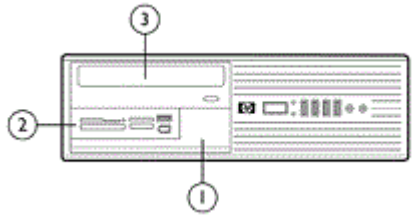
Expandability	Microtower	Small Form Factor	Ultra-Slim Desktop
PCI slots	1 full-height	1 low-profile	0
Max power per slot	35W	35W	NA
PCIe x1 slot	2	2	0
Max power per slot	10W	10W	NA
PCIe x16 slot	1 full-height	1 low-profile	0
Max power per slot	75W	35W	NA
Mini-PCIe x1 slot	0	0	1
Max power per slot	NA	NA	9.8W
External Bays			
3.5″	1	1	0
5.25″	2	1	0
Slimline ODD	0	0	1
IDE			
Internal 3.5″ HDD Bays	2	1	0
Internal 2.5″ HDD Bay	0	0	1
Hard Drive Controller (SATA) Supported	SATA	SATA	SATA
Hard Drive Interfaces Supported	SATA 3.0Gb/s	SATA 3.0Gb/s	SATA 3.0Gb/s

Standard Features and Configurable Components (availability may vary by country)

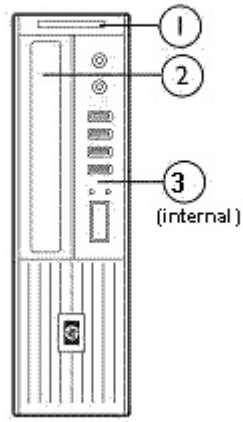
Microtower



Small Form Factor



Ultra-slim Desktop



Storage – Drive Support									
	Microtower			Small Form Factor			USDT		
	Media Card Reader or Pocket Media Drive (optional)	5.25″ Serial ATA Devices	3.5″ Serial ATA Devices	Media Card Reader or Pocket Media Drive (optional)	5.25″ Serial ATA Devices	3.5″ Serial ATA Devices	SDR	ODD	HDD, SSD
Quantity Supported	1	2	2	1	1	2	1	1	1
Position Supported	3	1,2	3,4,5	2	3	2,3	1	2	3

NOTE: The SATA port labeled SATA3 on the system board can be enabled by the BIOS as an eSATA port. Using it for an eSATA drive will require a separately purchased cable with an eSATA connector.

Standard Features and Configurable Components (availability may vary by country)

		MT	SFF	USDT
Hard Drive One or two of the following	160-GB SATA 3.0-Gb/s Hard Drive (8MB Cache, 7200 RPM, NCQ, Smart IV)	X	X	
	2.5" 160-GB SATA 3.0 Gb/s Hard Drive (8MB Cache, 7200 RPM, NCQ Smart IV)			X
	250-GB SATA 3.0-Gb/s Hard Drive (8MB Cache, 7200 RPM, NCQ, Smart IV)	X	X	
	2.5" 250-GB SATA 3.0Gb/s Hard Drive (8MB Cache, 7200 RPM, NCQ Smart IV)			X
	320-GB SATA 3.0-Gb/s Hard Drive (8MB Cache, 7200 RPM, NCQ, Smart IV)	X	X	
	500-GB SATA 3.0-Gb/s Hard Drive (16MB Cache, 7200 RPM, NCQ, Smart IV)	X	X	
	80-GB SATA 3.0-Gb/s Hard Drive (16MB Cache,10,000 RPM, NCQ, Smart III)	X	X	
	160-GB SATA 3.0-Gb/s Hard Drive (16MB Cache, 10,000 RPM, NCQ, Smart III)	X	X	
	3.5" Removable 160-GB SATA 3.0 Gb/s Hard Drive (8MB Cache, 7200 RPM, NCQ, Smart IV)	X	X	
	3.5" Removable 250-GB SATA 3.0 Gb/s Hard Drive (8MB Cache, 7200 RPM, NCQ, Smart IV)	X	X	
	3.5" Removable 500-GB SATA 3.0 Gb/s Hard Drive (8MB Cache, 7200 RPM, NCQ, Smart IV)	X	X	
	2nd hard drive, 160-GB SATA 3.0-Gb/s Hard Drive (8MB Cache, 7200 RPM, NCQ, Smart IV)	X	X	
	2nd hard drive, 250-GB SATA 3.0-Gb/s Hard Drive (8MB Cache, 7200 RPM, NCQ, Smart IV)	X	X	
	2nd hard drive, 320-GB SATA 3.0-Gb/s Hard Drive (8MB Cache, 7200 RPM, NCQ, Smart IV)	X	X	
	2nd hard drive, 500-GB SATA 3.0-Gb/s Hard Drive (16MB Cache, 7200 RPM, NCQ, Smart IV)	X	X	
	2nd hard drive, 80-GB SATA 3.0-Gb/s Hard Drive (16MB Cache,10,000 RPM, NCQ, Smart III)	X	X	
	2nd hard drive,160-GB SATA 3.0-Gb/s Hard Drive (16MB Cache, 10,000 RPM, NCQ, Smart III)	X	X	
	RAID 0,1 support	X	X	

Standard Features and Configurable Components (availability may vary by country)

Solid State Drive	64-GB Solid State Drive	X	X	X
	80-GB Solid State Drive			X
	RapidDrive	X	X	
	NOTE: RapidDrive is an optional new productivity solution available only on the HP Compaq 6005 Pro SFF and MT. It links the Solid State Drive (SSD) and Hard Drive together to form one virtual drive that combines the advantages of both technologies. Pre-installed applications reside on the SSD for reduced access time, yet the usual limitations of SSD storage are eliminated by linking it with a large hard drive.			
Removable Storage – One or more of the following depending on form factor (see Storage – Drive Support section above)	**Pocket Media Drive**			
	250GB Pocket Media Drive	X	X	X
	Media Reader			
	HP 22-in-1 Media Card Reader (USB connection on the system board)	X	X	
	HP 22-in1 (with 1394) Media Card Reader (USB connection on the system board)	X	X	
	Secure Digital (SD) HC Reader			X
	Optical Drives			
	SATA DVD-ROM Drive	X	X	
	SATA SuperMulti LightScribe DVD Writer Drive	X	X	
	SATA Blu-ray Writer	X	X	
	HP Slim DVD-ROM Drive			X
	HP Slim SuperMulti LightScribe DVD Writer Drive			X
Security	TPM 1.2 Embedded Security Chip*	X	X	X
	HP Desktop Security lock kit (lock and cable)	X	X	X
	HP Chassis Security Kit	X	X	X
	Security cable with Kensington lock	X	X	X
	HP Solenoid Hood Lock and Sensor	X	X	
	HP (USDT) Hood Sensor			X
	Optional HP ProtectTools 5.0 security software suite	X	X	X
	Optional LoJack Pro tracking and tracing subscription	X	X	X
	Optional USB Port Disable at factory (user configurable via BIOS)	X	X	X
	RAID 0,1 support	X	X	
	* TPM module disabled where use is restricted by law; for example, Russia.			
NIC	Broadcom NetXtreme Gigabit Ethernet BCM 5761 (integrated on system board)	X	X	X
	Broadcom NetXtreme Gigabit Ethernet Plus PCIe NIC	X	X	

Standard Features and Configurable Components (availability may vary by country)

Wireless	HP 802.11 b/g/n Wireless PCIe x1 card (full height bracket)	X		
	HP 802.11 b/g/n Wireless PCIe x1 card (low profile bracket)		X	
	HP 802.11 b/g/n Wireless PCIe x1 Half Mini Card (2x2)			X
Modem	LSI PCIe x1 56K International SoftModem	X	X	
Graphics	Integrated ATI Radeon HD 4200 Graphics*	X	X	X
	ATI Radeon HD 4650 (1 GB DH) PCIe x16 Graphics Card	X		
	ATI Radeon HD 4550 Dual Head PCIe x16 Graphics Card	X	X	
	NVIDIA Quadro NVS 290 PCIe x1 Graphics Card	X	X	
	NVIDIA Quadro NVS 290 (256MB DH) PCIe x16 Graphics Card	X	X	
	NVIDIA Quadro NVS 295 (256MB DH) PCIe x16 Graphics Card	X	X	
	NVIDIA GeForce 310 DP PCIe x16 Graphics Card	X	X	
	HP DisplayPort to VGA Adapter	X	X	X
	HP DisplayPort to DVI-D Adapter	X	X	X
	* Side Port memory: The AMD 785G chipset provides a Side Port memory interface for 128 MB of dedicated frame buffer DDR3 memory with a device width of x16 for the integrated graphics chip.			
Audio	Integrated High Definition audio with Realtek ALC261 codec (all ports are stereo)	X	X	X
	Microphone and Headphone front ports	X	X	X
	Line-out and Line-In rear ports*	X	X	X
	Multistreaming capable*	X	X	X
	Internal Speaker	X	X	X
	HP Thin USB Powered Speakers (optional)	X	X	X
	* Re-taskable ports; see technical specifications page 21.			
Input Devices	**Keyboard** – One of the following			
	HP PS/2 Standard Keyboard	X	X	X
	HP USB Standard Keyboard	X	X	X
	HP Smartcard Keyboard	X	X	X
	HP USB PS/2 Washable Keyboard	X	X	X
	HP USB Mini Keyboard	X	X	X
	Mouse – One of the following			
	USB 2-Button Laser Mouse	X	X	X
	PS/2 2-Button Optical Scroll Mouse	X	X	X
	USB 2-Button Optical Scroll Mouse	X	X	X

Standard Features and Configurable Components (availability may vary by country)

Miscellaneous	2nd serial port adapter	X		
	2nd serial port adapter (low profile)		X	
	Parallel port adapter	X	X	
	HP TV Tuner PCIe x1 Card	X	X	
	HP TV Tuner Mini PCIe Card			X
	HP FireWire / IEEE 1394 Adapter	X	X	
	Tower stand		X	X

After-Market Options (availability may vary by region)

		MT	SFF	USDT	Part Number
Communications	Wireless LAN				
	HP 802.11 b/g/n Wireless PCIe x1 card	X	X		FS577A
	NICs				
	Broadcom NetXtreme Gigabit Ethernet Plus PCIe NIC	X	X		EA833AA
	Modem				
	LSI PCIe x1 56K International SoftModem	X	X		FH970AA
Graphics	Multi head solutions				
	NVIDIA GeForce 310 DP PCIe x16 Graphics Card	X	X		VG885AA
	ATI Radeon HD 4550 (256MB DH) PCIe x16 Card	X	X		AT042AA
	ATI Radeon HD 4650 (1 GB DH) PCIe x16 Graphics Card	X			VN566AA
	HP DisplayPort to VGA Adapter	X	X	X	AS615AA
	HP DisplayPort to DVI-D Adapter	X	X	X	FH973AA
	NVIDIA Quadro NVS 290 (256MB DH) PCIe x1 Graphics Card	X	X		KN586AA
	NVIDIA Quadro NVS 290 (256MB DH) PCIe x16 Graphics Card	X	X		KG748AA
Hard Drives	Serial ATA Hard Drives				
	HP 160-GB SATA 3.0-Gb/s 7200 rpm Hard Drive	X	X		PY277AA
	HP 250-GB SATA 3.0-Gb/s 7200 rpm Hard Drive	X	X		PY278AA
	HP 320-GB SATA 3.0-Gb/s 7200 rpm Hard Drive	X	X		FH963AA
	HP 500-GB SATA 3.0-Gb/s 7200 rpm Hard Drive	X	X		KW347AA
	HP 80-GB SATA 3.0-Gb/s 10,000 rpm Hard Drive	X	X		EM172AA
	HP 160-GB SATA 3.0-Gb/s 10,000 rpm Hard Drive	X	X		EW222AA
	HP Removable SATA Hard Drive Enclosure (Frame & Carrier)	X	X		RY102AA
	HP Removable SATA Hard Drive Enclosure (Carrier Only)	X	X		RY103AA

After-Market Options (availability may vary by region)

Input/Output Devices	HP PS/2 Standard Keyboard	X	X	X	DT527A
	HP USB Standard Keyboard	X	X	X	DT528A
	HP USB Smartcard Keyboard	X	X	X	ED707AA
	HP USB Gray Standard Keyboard	X	X	X	DT529A
	HP USB PS/2 Washable Keyboard	X	X	X	VF097AA
	HP USB Mini Keyboard	X	X	X	AS601AA
	HP 2.4 GHz Wireless Keyboard and Mouse	X	X	X	NB896AA
	HP USB Laser Mouse	X	X	X	GW405AA
	HP PS/2 2-Button Optical Scroll Mouse	X	X	X	EY703AA
	HP USB 2-Button Optical Scroll Mouse	X	X	X	DC172B
Memory (DIMMs)	PC3-10600 (DDR3, 1333MHz) DIMMs Non-ECC				
	HP 4-GB PC3-10600 (DDR3 1333 MHz) DIMM	X	X		VH638AA
	HP 2-GB PC3-10600 (DDR3 1333MHz) DIMM	X	X		AT024AA
	HP 1-GB PC3-10600 (DDR3 1333 MHz) DIMM	X	X		AT023AA
	HP 4-GB PC3-10600 (DDR3 1333 MHz) SODIMM			X	VH641AA
	HP 2-GB PC3-10600 (DDR3 1333 MHz) SODIMM			X	VH640AA
Monitors	All HP monitors are supported that accept a graphics output provided by this PC. The LP3065 monitor can be supported by installing a graphics card that supports a dual-link DVI-D output.				
Multimedia	HP Thin USB Powered Speakers	X	X	X	KU901AV
Optical Drives	DVD-ROM Drive				
	HP SATA DVD-ROM Drive	X	X		AH047AA
	HP DVD-ROM Drive (Slimline)			X	FH967AA
	HP SuperMulti LightScribe Drive (Slimline)			X	KV843AA
	DVD Writer				
	SATA Blu-ray Writer	X	X		AR481AA
	HP SATA SuperMulti LightScribe DVD Writer Drive	X	X		GF343AA
Removable Storage	Removable Drives				
	HP 250GB Pocket Media Drive	X	X		FE477AA
	Multimedia				
	HP 22-in-1 Media Card Reader	X	X		FX273AA
	HP 22-in-1 (with 1394) Media Card Reader	X	X		KN518AA

After-Market Options (availability may vary by region)

Security	Kensington lock	X	X	X	PC766A
	HP Business PC Security Lock	X	X	X	PV606AA
	HP Chassis Security Kit	X	X	X	AR639AA
	HP ProtectTools 5.0 Client Security Software including HP ProtectTools Security Manager Credential Manager for HP ProtectTools Device Access Manager for HP ProtectTools Drive Encryption for HP ProtectTools Embedded Security for HP ProtectTools Java Card Security for HP ProtectTools LoJackPro for HP ProtectTools Privacy Manager for HP ProtectTools File Sanitizer for HP ProtectTools	X	X	X	TBD
	HP 2009 Wall Mount/Security Sleeve		X		TBD
Manageability	HP Client Configuration Automation Standard	X	X	X	T3488AA (qty 1) TA599AA (qty 10) TA600AA (qty 100) TA601AA (qty 500) T3489AA (qty 1000)
Brackets/Stands	HP 2009 Small Form Factor Tower Stand		X		VN569AA
	HP 2009 USDT Tower Stand			X	VN568AA
	HP Integrated Work Center Stand			X	GN783AA
	HP LCD Monitor QuickRelease	X	X	X	EM870AA
Miscellaneous Accessories	HP Serial Port Adapter Kit	X	X		PA716A
	HP Parallel Port Adapter Kit	X	X		KD061AA
	HP FireWire / IEEE 1394 Adapter	X	X		PA997A
	HP TV Tuner PCIe x1 Card	X	X		AZ524AA

Unit Environment and Operating Conditions	Microtower	Small Form Factor	Ultra-Slim Desktop
General Unit Operating Guidelines • Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range. • Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow. • Never restrict airflow into the computer by blocking any vents or air intakes. • Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air. • Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow. • If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.			
Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: -22° to 140° F(-30° to 60° C)		
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)		
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)		
* Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.			

	Microtower		Small Form Factor		Ultra-Slim Desktop
Power Supply	320-watt BTX power supply – Active PFC	320-watt 89% efficient* BTX power supply – Active PFC	240-watt BTX power supply – Active PFC	240-watt 89% efficient* BTX power supply – Active PFC	135W 87% efficient power supply – Active PFC
Operating Voltage Range	100-240VAC	100-240VAC	100-240VAC	100-240VAC	100-240 VAC
Rated Voltage Range	115V/230V	115V/230V	115V/230V	115V/230V	115V/230V
Rated Line Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Operating Line Frequency Range	47-63 Hz	47-63 Hz	47-63 Hz	47-63 Hz	47-63 Hz
Rated Input Current	5.5A	5.5A	4A	4A	2.4A
Power Supply Fan	Variable speed fan	Variable speed fan	Variable speed fan	Variable speed fan	
ENERGY STAR Compliant		X		X	X
External Power Adapter					
Dimensions					6.7 x 2.6 x 1.5 in
Total Cord Length					12 ft 8 in
* Energy efficient power supply is a requirement for ENERGY STAR qualification in conjunction with a select range of processors and modules ** Power consumption in the Off/Apparent Off mode is measured and reported with the network interface controller "Wake on LAN" feature disabled in F10 Setup (default is "enabled").					

ROM BIOS Information
Key features of the HP BIOS include: • Deployment and manageability – HP BIOS provides several technologies that help integrate the HP Business desktop computer into the enterprise, such as PXE, remote configuration, remote control, and F10 Setup support for 12 languages. • Stability – HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification. • Security – HP BIOS offers a robust and flexible set of security features to help the system administrator secure their systems from removal of sensitive data, and help prevent access by unauthorized users. Ability to disable USB ports. • Tracking and tracing capabilities in case of theft available in select countries (subscription sold separately). • Thermal and power management – The HP BIOS provides and enables thermal and power management technologies to assist in operating the HP Business Desktop computer in any enterprise environment. • Serviceability – HP BIOS provides diagnostic and detailed service information. • Upgrades and recovery – HP BIOS provides numerous ways to upgrade HP Business Desktop computers, including BIOS updates from within DOS (Flashlite), BIOS updates from within Windows (HPQFlash, SSM), HP Client Manager, and fail-safe recovery. In addition, the HP Business Desktop BIOS Utilities tool enables replicated BIOS setup throughout the Enterprise; it is available from within the BIOS software and from the support website. Additional HP BIOS Features • Administrator password – Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS. • Mute internal speaker • Disable USB ports, SATA ports, mini-PCIe slot, and integrated NIC

Other Features	Description
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). • Allows the system to wake from a low power mode. • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
SMBIOS Ver. 2.6	System Management BIOS, previously known as DMI BIOS, for system management information
Dual-State Power Button	Power button acts as both an on/off button and suspend-to-sleep button

Serviceability Features of System		
Dual Color Power LED on Front of Computer (Indicates Normal Operations and Fault Conditions)		
Diagnostic LED Explanation Table	Number of 1-second red LED blinks followed by 2-second pause, then repeats: 2-processor thermal protection activated 3-processor not installed 4-power supply failure 5-memory error 6-video error 7-PCA failure (ROM detected failure prior to video) 8-invalid ROM, bootblock recover mode	
• System/Emergency ROM	• Flash ROM	• CMOS Battery Holder for easy Replacement
• Flash Recovery with Video	• 5 Aux Power LED on System PCA	• Processor ZIF Socket for easy Upgrade
• Over-Temp Warning on Screen	• Clear Password Jumper	• DIMM Connectors for easy Upgrade
• Restore CD	• Clear CMOS Switch	• NIC LEDs (integrated) (Green & Amber)

Serviceability Features of Chassis		
• Dual Color Power and HD LED - To Indicate Normal Operations and Fault Conditions	• Color coordinated cables and connectors	• Tool-less Hood Removal (thumbscrews for Microtower, spring-loaded latch for Small Form Factor)
• Front power switch	• System memory can be upgraded on Microtower without removing any internal components	• Tool-less Hard Drive, CD & Diskette Removal
Additional Features	**Description**	
Towerable	Small Form Factor can be oriented as a tower (in addition to desktop orientation)	
Drive Self Tests (DPS) DPS Access through F10 Setup during Boot	• Drive Protection System • A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user. • Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced. • The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures.	
SMART IV Technology* (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted • Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count • By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure	
DASH 1.1 support (Desktop and Mobile Architecture for System Hardware)	A standards initiative for representing out-of-band management capability for computer systems. It is a secure, web-services based successor to ASF.	

ASF 2.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments

High Definition Audio	Type	Integrated
	High Definition Stereo Codec	Yes - 2-channel Realtek ALC261 codec
	Audio Jacks	Front microphone-In (150-K ohm Input Impedance) Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver) Rear Line-Out* (190 ohms Output Impedance, expects at least a 10-K ohm load) Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load)

NOTES:

Internal Speaker Amplifier is for Internal Speaker only. External Speakers need to be powered externally.

The rear input port can function as a Line-In or Microphone-In jack.

The front Microphone jack is retaskable to support headphones. When functioning as a headphone jack the same audio stream will be sent to both front jacks.

The front Microphone jack is also retaskable to function as a Line-in jack.

The Realtek Control Panel software required to reassign audio ports is preloaded but must be installed by the customer before these functions can be performed.

Multistreaming Capable	Multistreaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
Sampling	8 kHz – 192 kHz
Wavetable Syntheses (software)	Yes – Uses OS soft wavetable
Analog Audio	Yes
Number of Channels on Line-Out (mono/stereo)	Stereo (Left & Right channels)
Internal Audio Speaker Power Rating	1.5 W
Internal Speaker	Yes; ability to mute internal speaker through F10 Setup
External Speaker Jack (Line-Out)	Yes

Technical Specifications – Audio/Visual

HP PCIe x1 TV Tuner Card	Bus type	PCI Express (x1 lanes)	
	Tuner	Hybrid (NTSC, ATSC, or QAM) TV receiver	
	Digital TV Terrestrial support	RF band	Lower VHF, Upper VHF, UHF
		Demodulation	ATSC 8-VSB and 64/256 QAM
	Analog TV support	NTSC tuner	Yes
		Stereo audio broadcast decoder with BTSC stereo	
	Minimum System Requirements	PCI 1.0a/1.1(2.0 compatible), x1 Compliant Slot Microsoft Windows XP SP3 Microsoft DotNet Rev	
	Core power	3.35 W (max)	
	Dimensions (H x D)	2.71 in x 6.60 in (68.90 mm x 167.65 mm)	
	Weight	0.29 lb (133g)	
	Compliance standards	EMC Emissions: a) FCC Part 15, Subpart B – Unintentional Radiators, Class B Computing Devices for Home & Office Use d) Canadian BETS-7 compliant	

Technical Specifications - Communications

Integrated Broadcom NetXtreme Gigabit Ethernet BCM 5761	Connector		RJ-45
	Controller		Broadcom 5761 PCI-Express LAN Controller
	Memory		8 MB NVRAM serial Flash
	Data rates supported		10/100/1000 Mbps
	Compliance		IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3AB, 802.3u, 802.3i, and 802.3x
	Bus architecture		PCI-E
	Data path width		Single channel, PCI-E
	Data transfer mode		Bus-master DMA
	Power requirement		1.8W @ 3.3V
	Boot ROM support		Yes
	Network transfer mode		Full-duplex
			Half-duplex (not available for the 1000BASE-T transceiver)
	Network transfer rate		10BASE-T (half-duplex) 10 Mbps
			10BASE-T (full-duplex) 20 Mbps
			100BASE-TX (half-duplex) 100 Mbps
			100BASE-TX (full-duplex) 200 Mbps
			1000BASE-T (full-duplex) 2000 Mbps (actual rate limited by PCI Bus)
	Environmental	Operating temperature	32° to 131°F (0° to 55° C)
		Operating humidity	131° F (55° C) with 5% to 95% non-condensing humidity
	Management capabilities		ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0, Broadcom mgmt utility, ASF2.0, DASH 1.0 and DASH 1.1 profiles

Broadcom NetXtreme Gigabit Ethernet Plus PCIe NIC Card	Connector		RJ-45
	Controller		Broadcom 5761 PCI-Express LAN Controller
	Memory		8 MB NVRAM serial Flash
	Data rates supported		10/100/1000 Mbps
	Compliance		IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3AB, 802.3u, 802.3i, and 802.3x
	Bus architecture		PCI-E
	Data path width		Single channel, PCI-E
	Data transfer mode		Bus-master DMA
	Hardware certifications		FCC class B, Canada and US NRTL Mark, C-Tick for Australia, BSMI for Taiwan, VCCI for Japan, MIC for Korea, GOST for Russia, UL listed (E212044), European Union Notice (CE 0682)
	Power requirement		1.8W @ 3.3V
	Boot ROM support		Yes
	Network transfer mode		Full-duplex
			Half-duplex (not available for the 1000BASE-T transceiver)

Technical Specifications - Communications

	Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps (actual rate limited by PCI Bus)	
	Environmental	Operating temperature	32° to 131°F (0° to 55° C)
		Operating humidity	131° F (55° C) with 5% to 95% non-condensing humidity
	Dimensions	2.75 in x 4.13 in (7 cm x 10.5 cm), low profile compatible	
	Management capabilities	ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0, Broadcom mgmt utility, ASF2.0, DASH 1.0 and DASH 1.1 profiles	
HP 802.11b/g/n Wireless PCIe x1 Card	Dimensions (L x H)	3.3 x 4.7 inches (8.5 x 12 cm)	
	Weight	0.08 pounds (40 g)	
	Controller	Ralink RT2790	
	System interface	PCIExpress x1	
	Network standard	802.11 b/g/n	
	Frequency band	2.400 - 2.497 GHz	
	Operating temperature	14° to 149°F, operating (-10° to 65°C, operating)	
	Storage temperature	-40° to 176°F, non-operating (-40° to 80°C, non-operating)	
	Humidity	10-90% operating 5-95% non-operating	
	Operating voltage	3.3V +/- 9% 12V +/- 8%	
	Power consumption	Platform/WLAN Mode	Power Consumption
		Maximum Power Consumption	10 Watts
		Transmit Only	4 Watts maximum averaged power over 1 second
		Transmit Packet or Active Scanning	1000 mA peak current for 100 microseconds or longer
		Receive Only Mode or Idle without IEEE PSP mode enabled	3 Watts maximum averaged over 1 second
		Idle, with IEEE PSP mode enabled	1.0 Watts maximum averaged over 1 second
		Transmit Disabled (turned off in software)	50 mW maximum, averaged over 1 second
		Platform in S3 or S4 (power removed from Low Profile PCI Express Card)	5 mW maximum, averaged over 1 second

Output power (approximately)	802.11b modes	802.11g modes	EWC modes
	+19 dBm +/- 1.0 dB maximum	+17 dBm +/- 1.0 dB maximum	+17 dBm +/- 1.0 dB maximum (total power in all transmit chains)
Receive sensitivity	Mode	Data rate	Sensitivity
	802.11b	1 Mbps	-94 dBm
	802.11b	11 Mbps	-85 dBm
	802.11g	6 Mbps	-91 dBm
	802.11g	18 Mbps	-85 dBm
	802.11g	48 Mbps	-75 dBm
	802.11g	54 Mbps	-72 dBm
	EWC (2.4 GHz)	6.5 Mbps	-87 dBm
	EWC (2.4 GHz)	54 Mbps	-82 dBm
	EWC (2.4 GHz)	81 Mbps	-78 dBm
	EWC (2.4 GHz)	162 Mbps	-74 dBm
	EWC (2.4 GHz)	270 Mbps	-68 dBm
	EWC (2.4 GHz)	300 Mbps	-64 dBm
Data transfer rate	Data Rate (MCS)	Minimum Throughput	
	1 Mbps (802.11 b)	700 kbps	
	2 Mbps (802.11 b)	1.4 Mbps	
	5.5 Mbps (802.11 b)	3.5 Mbps	
	11 Mbps (802.11 b)	5.9 Mbps	
	12 Mbps (802.11 g)	6 Mbps	
	18 Mbps (802.11 g)	9 Mbps	
	24 Mbps (802.11 g)	12 Mbps	
	36 Mbps (802.11 g)	18 Mbps	
	48 Mbps (802.11 g)	21 Mbps	
	54 Mbps (802.11 g)	22.5 Mbps	
	6.5 Mbps (20 MHz EWC)	4.5 Mbps	
	13 Mbps (20 MHz EWC)	9 Mbps	
	19.5 Mbps (20 MHz EWC)	13.5 Mbps	
	26 Mbps (20 MHz EWC)	18 Mbps	
	39 Mbps (20 MHz EWC)	27 Mbps	
	52 Mbps (20 MHz EWC)	36 Mbps	
	58.5 Mbps (20 MHz EWC)	40 Mbps	
	65 Mbps (20 MHz EWC)	45 Mbps	
	78 Mbps (20 MHz EWC)	54 Mbps	
	104 Mbps (20 MHz EWC)	72 Mbps	
	117 Mbps (20 MHz EWC)	81 Mbps	

		130 Mbps (20 MHz EWC)	91 Mbps
		13.5 Mbps (40 MHz EWC)	8 Mbps
		27 Mbps (40 MHz EWC)	16 Mbps
		40.5 Mbps (40 MHz EWC)	24 Mbps
		54 Mbps (40 MHz EWC)	32 Mbps
		81 Mbps (40 MHz EWC)	48 Mbps
		108 Mbps (40 MHz EWC)	64 Mbps
		121.5 Mbps (40 MHz EWC)	72 Mbps
		135 Mbps (40 MHz EWC)	81 Mbps
	Security	• IEEE and WiFi compliant 64 / 128 bit WEP encryption • AES: CCM • 802.1x authentication • WPA: 802.1x. WPA-PSK and TKIP • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through V5	
	Antenna	HP part number 497792-001	
	Certifications	Wi-Fi certified	
	Certifications for use by country	United States, Canada, Peru, Taiwan	

HP 802.11b/g/n Wireless PCIe x1 Half Mini Card	Dimensions (L x H)	26.8 mm x 30.00 mm	
	Weight	0.08 pounds (40 g)	
	Controller	Ralink RT3092	
	System interface	PCIExpress x1	
	Network standard	802.11 b/g/n compliant	
	Frequency band	2.400 – 2.497 GHz	
	Operating temperature	14° to 149°F, operating (-10° to 65°C, operating)	
	Storage temperature	-40° to 176°F, non-operating (-40° to 80°C, non-operating)	
	Humidity	10 – 90% operating 5 – 95% non-operating	
	Operating voltage	3.3V +/- 9% 12V +/- 8%	
	Power consumption	Platform/WLAN Mode	Power Consumption
		Maximum Power Consumption	10 Watts
		Transmit Only	4 Watts maximum averaged power over 1 second
		Transmit Packet or Active Scanning	1000 mA peak current for 100 microseconds or longer

	Receive Only Mode or Idle without IEEE PSP mode enabled	3 Watts maximum averaged over 1 second	
	Idle, with IEEE PSP mode enabled	1.0 Watts maximum averaged over 1 second	
	Transmit Disabled (turned off in software)	50 mW maximum, averaged over 1 second	
	Platform in S3 or S4 (power removed from Low Profile PCI Express Card)	5 mW maximum, averaged over 1 second	
Output power (approximately)	802.11b modes	802.11g modes	EWC modes
	+19 dBm +/- 1.0 dB maximum	+17 dBm +/- 1.0 dB maximum	+17 dBm +/- 1.0 dB maximum (total power in all transmit chains)
Receive sensitivity	Mode	Data rate	Sensitivity
	802.11b	1 Mbps	-94 dBm
	802.11b	11 Mbps	-85 dBm
	802.11g	6 Mbps	-91 dBm
	802.11g	18 Mbps	-85 dBm
	802.11g	48 Mbps	-75 dBm
	802.11g	54 Mbps	-72 dBm
	EWC (2.4 GHz)	6.5 Mbps	-87 dBm
	EWC (2.4 GHz)	54 Mbps	-82 dBm
	EWC (2.4 GHz)	81 Mbps	-78 dBm
	EWC (2.4 GHz)	162 Mbps	-74 dBm
	EWC (2.4 GHz)	270 Mbps	-68 dBm
	EWC (2.4 GHz)	300 Mbps	-64 dBm
Data transfer rate	Data Rate (MCS)	Minimum Throughput	
	1 Mbps (802.11 b)	700 kbps	
	2 Mbps (802.11 b)	1.4 Mbps	
	5.5 Mbps (802.11 b)	3.5 Mbps	
	11 Mbps (802.11 b)	5.9 Mbps	
	12 Mbps (802.11 g)	6 Mbps	
	18 Mbps (802.11 g)	9 Mbps	
	24 Mbps (802.11 g)	12 Mbps	
	36 Mbps (802.11 g)	18 Mbps	
	48 Mbps (802.11 g)	21 Mbps	
	54 Mbps (802.11 g)	22.5 Mbps	
	6.5 Mbps (20 MHz EWC)	4.5 Mbps	
	13 Mbps (20 MHz EWC)	9 Mbps	
	19.5 Mbps (20 MHz EWC)	13.5 Mbps	

		26 Mbps (20 MHz EWC) 18 Mbps 39 Mbps (20 MHz EWC) 27 Mbps 52 Mbps (20 MHz EWC) 36 Mbps 58.5 Mbps (20 MHz EWC) 40 Mbps 65 Mbps (20 MHz EWC) 45 Mbps 78 Mbps (20 MHz EWC) 54 Mbps 104 Mbps (20 MHz EWC) 72 Mbps 117 Mbps (20 MHz EWC) 81 Mbps 130 Mbps (20 MHz EWC) 91 Mbps 13.5 Mbps (40 MHz EWC) 8 Mbps 27 Mbps (40 MHz EWC) 16 Mbps 40.5 Mbps (40 MHz EWC) 24 Mbps 54 Mbps (40 MHz EWC) 32 Mbps 81 Mbps (40 MHz EWC) 48 Mbps 108 Mbps (40 MHz EWC) 64 Mbps 121.5 Mbps (40 MHz EWC) 72 Mbps 135 Mbps (40 MHz EWC) 81 Mbps
	Security	• IEEE and WiFi compliant 64 / 128 bit WEP encryption • AES: CCM • 802.1x authentication • WPA: 802.1x. WPA-PSK and TKIP • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through V5
	Antenna	HP part number 497792-001
	Certifications	Wi-Fi certified (Remove: Although the card is certified, all combinations/antennas are not Wi-Fi "n" logo certified)
	Certifications for use by country	United States, Canada, Peru, Taiwan
LSI PCIe x1 56K International SoftModem	Data Transmission	Technology speeds: 56,000 Kbps maximum downstream data, controllerless NOTE: 56 Kbps technology refers to download speeds only and requires compatible modems at server sites. Other conditions may limit modem speed. FCC limitations allow a maximum of 53 Kbps during download transmissions.
	Data Speeds	(Upload only) 33,600/31,200/28,800/26,400/21,600/19,200/16,800/14,400/12,000/9,600/7,200/4,800/2,400/1,200/300
	Data Standards	ITU-T V.90, ITU-T, ITU-T V.34, V.44, V.42, V.42bis21, V.32bis, Bell 212A, and Bell 103
	Fax Speeds	14,400/12,000/9,600/7,200/4,800/2,400/1,200/300 b/s

Technical Specifications - Communications

Fax Mode Capabilities	ITU-T T.31 class 1 FAX, V. 17, V.29, V.27ter, and V.21 Channel 2
Error Correction and Data Compression	V.44, 42bis, V.42 and MNP2-5
Power Management	PCI Bus Power Management Interface Specification (PCI-PM) Revision 1.2, Appendix A. D0, D3hot, and D3cold. Wake on Ring state when in D3cold. If the power management event (PME) feature is enabled in D3cold, a modem can wake the system via WAKE# (WAKEN) or beacon. Meets PCI Express 1.1 standard.
Upgradeability	Driver upgradeable for future enhancements
Video	ITU-T V.80 video ready interface
Other	TIA/EIA 602 standard AT command set
	Integrated DTE interface with speeds of up to 115.2 Kbps, parallel 16550a UART-compatible interface
	Optional ring wakeup signal
Operating Temperature	32° to 158° F (0° to 70° C)
Operating Humidity	20% to 90%, non-condensing
Power	Requires a 3.3-V auxiliary power rail on PCI express bus
	Uses only one PCI express load (i.e., one grant/request pair), one shared IRQ, one electrical load
Chipset	LSI SV92EX - Integrated PCI interface with 3.3-V tolerant buffers and CardBus support
Dimensions (L X H)	Complies with PCI express low profile specifications-6.7 x 2.3 in (17.0 x 5.8 cm) and supports high- and low-profile brackets
Connection	Single RJ-11 connector
Other Features	Digital line protection, call progress monitoring via on-board piezo device, support for high profile and low profile brackets, PnP ID support
Safety	UL recognized to UL 1950, 3rd edition (U.S. and Canada); IEC 950 (TUV, NEMKO, DEMKO, SEMKO); CE Mark, EC 950 (TUV, NEMKO, DEMKO, SEMKO, CE mark
EMC	FCC Part 15, IC ES003, EN 55022, 3rd edition, EN 55024, annex A, EN 61000-4-6, EN 61000-4-8
Telecom	FCC Part 68, IC-CS-03 (Canada); Worldwide PTT approvals Not available in Korea or the Republic of South Africa.
Other	The SV92EX device is packaged in a 32-pin micro leadless chip carrier (MLCC). The SV92EX is fully compliant with the PCI Express revision 1.1 specification. WHQL approved; ASPM compliant.

Technical Specifications - Graphics

Integrated ATI HD 4200 Gaphics	Memory	Variable and User selectable in BIOS settings
	Controller Clock Speed	500MHz
	Maximum Color Depth	32 bpp
	Multi-display Support	Yes
	Graphics/Video API Support	DX10, OpenGL 2.0
	Output connectors	1 VGA, 1 DisplayPort (Multi-Mode (DP++) 1.1a compliant)
	VGA DAC Frequency	400 MHz

Resolutions Supported	Resolution	Maximum Refresh Rate (Hz)	
		Analog Connection	Digital Connection
	640x480	85	60
	800x600	85	60
	1024x768	85	60
	1280x720	85	60
	1280x1024	85	60
	1440x900	75	60
	1600x1200	85	60
	1680x1050	75	60
	1920x1080	85	60
	1920x1200	85	60
	1920x1440	85	60
	2048x1536	75	60
	2560x1600		60

ATI Radeon HD 4650 (1 GB DH) PCIe x16 Graphics Card (FH Only)	Bus type	PCI Express (x16 lanes)	
	Maximum vertical refresh rate	85 Hz	
	Display support	Integrated 400 MHz RAMDAC	
	Display max resolution	2560 x 1600 digital, 2048 x 1536 analog	
	Board display options	Supports two displays through any combination of two of the three output ports.	
	Board configuration	Specification	Description
		Graphics Chip	RV730Pro
		Core clock	600 MHz
		Memory clock	500 MHz
		Frame buffer	1 GB DDR3, 128 bit wide
	Maximum power	55 W	
	Languages supported	24 languages: English, Arabic, Chinese Simplified, Chinese Traditional, Czechoslovakian, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish	
	Compliance standards	EMC Emissions:	

a) CISPR22: 1997/EN 55022:1998 - Class B - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment

EMC Immunity:
CISPR 24:1997/EN 55024:1998 - Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement.

ATI Radeon HD 4650 (1 GB) PCIe x16 Graphics Card display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP.

	Maximum Refresh Rate (Hz)	
Resolution	Analog Connection	Digital Connection
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R*
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	60**

* Max HDMI resolution is 1080p
** Only supported when using a dual-link DVI connection
NOTE: 60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections.

ATI Radeon HD 4550 (256 MB DH) PCIe x16 Graphics Card

Bus type	PCI Express (x16 lanes)	
Maximum vertical refresh rate	85 Hz	
Display support	Integrated 400 MHz RAMDAC	
Display max resolution	1900 x 1200 digital, 2048 x 1536 analog	
Board display options	Supports two displays via included DMS-59 to dual VGA cable or 2 DVI monitors via optional DMS-59 to dual DVI cable kit part number: DL139A. 4-pin mini-DIN S-video connector for TV output	
Board configuration	Specification	Description
	Graphics Chip	RV710
	Core clock	600MHz
	Memory clock	800 MHz
	Frame buffer	256 MB DDR2, 64 bit wide
Languages supported	24 languages: English, Arabic, Chinese Simplified, Chinese Traditional, Czechoslovakian, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish	

Compliance standards

EMC Emissions:
a) FCC Part 15, Subpart B - Unintentional Radiators, Class B Computing Devices for Home & Office Use
b) CISPR22: 1997/EN 55022:1998 - Class B - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment
c) Canadian Standard ICES-003 is equivalent to CISPR22
d) Taiwanese Standard BSMI
e) Japanese VCCI
f) Australian C-Tick
g) Korean (KCC)

EMC Immunity:
CISPR 24:1997/EN 55024:1998 - Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement.

ATI Radeon HD 4550 DH PCIe x16 Graphics Card display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP.

	Maximum Refresh Rate (Hz)	
Resolution	Analog Connection	Digital Connection
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	N/A

NOTE: 60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections.

NVIDIA GeForce 310 DP PCIe x16 Graphics Card

Bus type	PCI Express (x16 lanes)
Maximum vertical refresh rate	85 Hz
Display support	Integrated 400 MHz RAMDAC
Display max resolution	2560x1600 digital, 2048 x 1536 analog

NVIDIA GeForce 310 DP PCIe x16 Graphics Card display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP.

Technical Specifications - Graphics

Resolution	Maximum Refresh Rate (Hz)	
	Analog Connection	Digital Connection
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	60*

* Only supported when using a dual-link DVI or DP connection.
NOTE: 60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections.

Board display options	Supports two displays via the DisplayPort and DVI connectors	
Board configuration	Specification	Description
	Graphics Chip	RV620
	Core clock	750 MHz
	Memory clock	500 MHz
	Frame buffer	512 MB DDR3, 64 bit wide
Audio Support (through HDMI only)	Integrated HD Audio codec supports linear PCM and Dolby® Digital (7.1) audio formats for HDMI output	
Operating systems support	Windows 7 Home Basic*, Windows 7 Home Premium*, Windows 7 Professional Edition 32*, Windows 7 Professional Edition 64*, Windows 7 Ultimate Edition 32*, Windows 7 Ultimate Edition 64*, Windows Vista Business 32†, Windows Vista Business 64†, Windows Vista Home Basic 32†, Windows Vista Home Basic 64†, Windows XP Professional or Windows XP Home 32†.	

*This system may require upgraded and/or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See: http://www.microsoft.com/windows/windows-7/ for details.

Windows 7 Business disk may be included for future upgrade if desired. To qualify for this downgrade an end user must be a business (including governmental or educational institutions) and is expected to order at least 25 customer systems with the same custom image

† Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements.

	Linux x86 and x86_64 distributions using XFree86 or X.Org‡. ‡Linux drivers are available from ATI's website and may be available in a Linux distribution. Refer to the Open Source and Linux from HP website: http://www.hp.com/wwsolutions/linux/products/clients/ for support information.
Core power	22 W (max)
Dimensions (H x D)	2.71 in x 6.60 in (68.90 mm x 167.65 mm)
Weight	0.30 lb (134.3 g)
Option kit contents	• NVIDIA GeForce 310 DP PCIe x16 Graphics Cardwith full height bracket attached • DVI to VGA adapter • Software CD with graphics drivers • Low profile bracket to convert the card for using in a low profile chassis • Warranty documentation
Compliance standards	EMC Emissions: a) FCC Part 15, Subpart B - Unintentional Radiators, Class B Computing Devices for Home & Office Use b) CISPR22: 1997/EN 55022:1998 - Class B - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment c) Canadian Standard ICES-003 is equivalent to CISPR22 d) Taiwanese Standard BSMI e) Japanese VCCI f) Australian C-Tick g) Korean (MIC) EMC Immunity: CISPR 24:1997/EN 55024:1998 - Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement.

NVIDIA Quadro NVS 290 PCIe x1 Graphics Card	Bus type	PCIe x1 Low profile, both ATX and low profile brackets included
	Graphics Controller	Integrated Quadro 290 2D graphics processor unit (GPU)
	Memory	256 MB DDR2
	Connector	Single high-density DMS-59 Flex Connector
	Dimensions	Low-profile, 2.586 x 6.6 in (6.57 x 16.76 cm)
	Multi-monitor support	Dual analog or digital (Single Link DVI) monitors (DVI support requires optional DVI cable kit DL139A)
	RAMDAC	Dual 350 MHz (integrated)
	Maximum pixel clock	350 MHz
	Overlay planes	One 1-bit Video overlay plane
	High-definition Video Processor (HDVP)	Full screen, full frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling

Input/Output connectors	DMS-59	
Board display options	Supports two displays via included DMS-59 to dual VGA cable or 2 DVI monitors via optional DMS-59 to dual DVI-I single-link connectors cable kit part number: DL139A.	
Board configuration	Specification	Description
	Description	G86-825
	Core clock	460 MHz
	Memory clock	400 MHz
	Frame buffer	256 MB DDR2, 64 bit wide

NVIDIA Quadro NVS 290 PCIe x1 Graphics Card display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as the may not have been tested and qualified by HP.

	Maximum Refresh Rate (Hz)	
Resolution	Analog Connection	Digital Connection
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	N/A

NOTE: 60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections.

NVIDIA Quadro NVS 290 256MB Dual Head PCIe x16 Graphics Card	Form Factor	Low Profile
	Bus Type	PCIe x16
	Memory	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connector	DMS-59, includes DMS-59 to Dual DVI-I cable. DMS-59 to Dual VGA cable available as an option.
	Display Resolution Support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link). nVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	RAMDAC	Integrated dual 400MHz
	Color planes	32-bit color buffer
	Overlay planes	Hardware supported

Technical Specifications - Graphics

	nView architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows.
	Multi-Monitor support	Dual monitor support
	DVI support	DMS-59 (to dual DVI-SL)
	High-definition Video Processor (HDVP)	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
	Supported graphics APIs	OGL 2.1 & DX10 Support; Shader Model 4.0
NVIDIA Quadro NVS 295 (256MB DH) PCIe x 16 Graphics Card	Form Factor	2.731 inches (H) × 6.600 inches (L), Half-Height
	Graphics Controller	NVIDIA Quadro NVS 295 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	256 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 DisplayPort Comes with 2 DisplayPort to VGA Adapters ('DisplayPort to DVI-D' and 'DisplayPort to DL DVI-D adapters available as an accessory)
	Maximum Resolution	Two DisplayPort outputs drive two digital displays up to 2560 x 1600
	Display Output	• Drives DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking • Drives DVI enabled digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking (through DisplayPort to DVI-D (single link) cable)
	Supported Graphics APIs	OpenGL 3.0 DirectX 10.0
HP DisplayPort to DVI-D Adapter	Connectors	DisplayPort and DVI-D single link connector
	Adapter length	7.5 in (19.0 cm)
	Adapter weight	.10 lbs (.05 kg)

Technical Specifications - Graphics

HP DisplayPort to VGA Adapter	Connectors	DisplayPort and VGA connector
	Adapter length	8 in (20 cm)
	Adapter weight	.1 lbs (.06 kg)
	Maximum vertical refresh rate	85 Hz
	Display support	162 MHz RAMDAC
	Display max resolution	1600x1200

HP DisplayPort to VGA adapter display resolutions and refresh rates

NOTE: Other resolutions may be available but are not recommended as they may not have been tested and qualified by HP. Using the HP DisplayPort to VGA Adapter may require an update to the graphics driver installed on your system. To install the most up-to-date graphics driver go to: www.hp.com.

Resolution	Max refresh rate
640x480	85
800x600	85
1024x768	85
1280x720	85
1280x1024	85
1440x900	75
1600x1200	60
1680x1050	60
1920x1080	60-R
1920x1200	60-R
NOTE: 60-R denotes reduced blanking timings are used. Not all monitors support reduced blanking timing.	

Technical Specifications - Internal Storage

7200 RPM Serial ATA Hard Drives	500-GB	Capacity	500,107,862,016 bytes	
		Height	1 in (2.54 cm)	
		Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2.0 ms
			Average	11 ms
			Full-Stroke	21 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	976,773,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	320-GB	Capacity	320,072,933,376 bytes	
		Height	1 in (2.54 cm)	
		Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Buffer	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	1.0 ms
			Average	8.5 ms
			Full-Stroke	18 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	625,142,448	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	250-GB	Capacity	250,059,350,016 bytes	
		Height	1 in (2.54 cm)	
		Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Buffer	8 MB	

		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms
			Average	8.5 ms
			Full-Stroke	18 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	488,397,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	160-GB	**Capacity**	160,041,885,696 bytes	
		Height	1 in (2.54 cm)	
		Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA (3.0 Gb/s)	
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
		Buffer	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.9 ms
			Average	9.3 ms
			Full-Stroke	18 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	312,581,808	
		Operating Temperature	41° to 131° F (5° to 55° C)	
10,000 RPM Serial ATA Hard Drives	160-GB	**Capacity**	160,041,885,696 bytes	
		Height	1 in (2.54 cm)	
		Width	Media diameter: 2.5 in (? cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 3.0 Gb/s	
		Cache	16 Mbytes	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.3 ms
			Average	4.6 ms
			Full-Stroke	10.2 ms
		Rotational Speed	10,000 rpm	
		Logical Blocks	312,581,808	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	80-GB	**Capacity**	80,026,361,856 bytes	
		Height	1 in (2.54 cm)	
		Width	Media diameter: 2.5 in (? cm) Physical size: 4 in (10.2 cm)	

		Interface	Serial ATA (1.5 Gb/s), Native Command Queuing enabled
		Synchronous Transfer Rate (Maximum)	Up to 3.0 Gb/s
		Cache	16 Mbytes
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track** 0.3 ms **Average** 4.6 ms **Full-Stroke** 10.2 ms
		Rotational Speed	10,000 rpm
		Logical Blocks	156,301,488
		Operating Temperature	41° to 131° F (5° to 55° C)
2.5" 7200 RPM Serial ATA Hard Drives	250 GB	**Capacity**	250,059,350,016 bytes
		Height (Nominal)	0.374 in (9.5 mm)
		Width (Nominal)	Media diameter: 2.5 in (63.5 mm) Physical size: 2.75 in (70 mm)
		Interface	Serial ATA (3.0 Gb/s)
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s
		Cache	8 MB
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track** 2.0 ms **Average** 12 ms **Full-Stroke** 22 ms
		Rotational Speed	7,200 rpm
		Logical Blocks	488,397,168
		Operating Temperature	41° to 131° F (5° to 55° C)
	160 GB	**Capacity**	160,041,885,696 bytes
		Height (Nominal)	0.374 in (9.5 mm)
		Width (Nominal)	Media diameter: 2.5 in (63.5 mm) Physical size: 2.75 in (70 mm)
		Interface	Serial ATA (3.0 Gb/s)
		Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s
		Cache	8 MB
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track** 2.0 ms **Average** 12 ms **Full-Stroke** 22 ms
		Rotational Speed	7,200 rpm
		Logical Blocks	312,581,808
		Operating Temperature	41° to 131° F (5° to 55° C)

64 GB Solid State Drive	Capacity	64 GB	
	NAND Flash Memory	Multi Level Cell (MLC) with wear leveling controller	
	Interface type	SATA 3Gb/sec	
	Dimensions-external (W x H x D)	2.74 x 0.37 x 4 in (6.98 x 0.95 x 10.2 cm)	
	Weight	0.14 lb (65 g)	
	Internal transfer rate	Write speed	Up to 220 MB/s
		Read speed	Up to 120 MB/s
	Host transfer rate	Ultra DMA mode	Up to 150 MB/s
	Power	DC power requirement	5 VDC 5%-100 mV ripple p-p
		Total power consumption	<1.12Watt
	Environmental (all conditions, non-condensing)	Temperature (operating)	32° to 158° F (0° to 70° C)
		Relative Humidity (operating)	5% to 95%
		Maximum Wet Bulb Temperature (operating)	84° F (29° C)
	Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS CISPR 22:2002 Class B, R1113 and C1172 Class B	

* For solid state disk drives, GB means 1 billion bytes. 16GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features. Actual capacity varies by content and will be less than 15.8GB.

Technical Specifications - Input/Output Devices

USB Standard Keyboard	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
		Weight	2 lb (0.9 kg) minimum
	Electrical	Operating voltage	+ 5VDC ± 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		System interface	USB Type A plug connector
		ESD	CE level 4, 15-kV air discharge
		EMI - RFI	Conforms to FCC rules for a Class B computing device
		Microsoft® PC 99 - 2001	Functionally compliant
	Mechanical	Languages	38 available
		Keycaps	Low-profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes (using Hasco modified tester)
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	6 ft (1.8 m)
		Microsoft PC 99 - 2001	Mechanically compliant
		Acoustics	43-dBA maximum sound pressure level
	Environmental	Operating temperature	50° to 122° F (10° to 50° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Operating humidity	10% to 90% (non-condensing at ambient)
		Non-operating humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, six surfaces
		Non-operating shock	80 g, six surfaces
		Operating vibration	2-g peak acceleration
		Non-operating vibration	4-g peak acceleration
		Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
		Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
	Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
	Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
	Kit contents	Keyboard, installation guide, warranty card, safety and comfort guide	

Technical Specifications - Input/Output Devices

PS/2 Standard Keyboard	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
		Weight	2 lb (0.9 kg) minimum
	Electrical	Operating voltage	+ 5VDC ± 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		System interface	PS/2 6-pin mini din connector
		ESD	CE level 4, 15-kV air discharge
		EMI - RFI	Conforms to FCC rules for a Class B computing device
		Microsoft PC 99 - 2001	Functionally compliant
	Mechanical	Languages	38 available
		Keycaps	Low-profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes (using Hasco modified tester)
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	6 ft (1.8 m)
		Microsoft PC 99 - 2001	Mechanically compliant
		Acoustics	43-dBA maximum sound pressure level
	Environmental	Operating temperature	50° to 122° F (10° to 50° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Operating humidity	10% to 90% (non-condensing at ambient)
		Non-operating humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, six surfaces
		Non-operating shock	80 g, six surfaces
		Operating vibration	2-g peak acceleration
		Non-operating vibration	4-g peak acceleration
		Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
		Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
	Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
	Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
HP USB Smartcard Keyboard	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
		Form factor	USB basic Smart Card keyboard
		Colors	Carbonite/Silver
		Dimensions (H x W x D)	18.2 x 6.3 x 1.3 in (46.3 x 16.1 x 3.3 cm)
		Weight	2 lb (0.9 kg) minimum
	Electrical	Operating voltage	+ 5VDC ± 5%

	Power consumption	100-mA maximum (with four LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
Mechanical	Languages	30+ available
	Keycaps	Low-profile design
	Switch actuation	55 g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
Environmental	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
SMARTCARD function	Support	All ISO 7816 smart cards
	Interface	Reads from and writes to all ISO7816-1, 2, 3, 4 memory and microprocessor smart cards (T=0, T=1)
	Chipset	SCM STCII
	Standard APIs supported	PC/SC, EMV2000, SET
	Power	USB Port Short circuit detection (protects smart card and reader) Power supply compliant with ISO7816 and EMV (5V, 60 mA) Supports 3-V and 5-V cards
	Power consumption	250-mA maximum draw (50 mA for the keyboard with three LEDs ON and 200-mA maximum startup current using a high-current, 60-mA smart card)

	Communication	From card	Programmable from 9,600 baud to 115,200 baud
		From computer	Up to 38,400 baud
	Landing mechanism	Contact device	Friction contact
		Card insertions rating	Up to 100,000 insertion cycles
	Interface modes	USB communications through USB port SCM protocol Automatic card insertion/removal detection	
	Reader performance interface	USB connection	
	Electro-magnetic standards	Europe	89/336/CEE guideline
		USA	USAFCC part 15

HP USB 2-Button Laser Mouse	Scroll Wheel	24	
	Maximum Rotation Speed	48 rats/sec	
	Switch Type	wheel	
	Switch Life	Button - 3,000,000 Wheel - 1,000,000 times Tilt switch - 500,000 times	
	Environmental	Operating Temperature	32° to 104° F (0° to 40° C)
		Non-operating Temperature	-4° to 140° F (-20° to 60° C)
		Operating Humidity	10% to 90% (non-condensing at ambient)
		Non-operating Humidity	20% to 80% (non-condensing at ambient)
		Operating Shock	40 g, six surfaces
		Non-operating Shock	80 g, six surfaces
		Operating Vibration	2-g peak acceleration
		Non-operating Vibration	4-g peak acceleration
	Electrical	Operating Voltage	+ 5VDC ± 5%
		Power Consumption	
		MTBF	> 150,000 hrs
		ESD	IEC-61000-4-2 criteria B, Contact discharge: +/- 4kV, Air discharge: +/- 8kV
		EMI-RFI	FCC Class B
		PC98	PC 99 Compliant
	Mechanical	Resolution	800dpi
		Tracking Speed	25 cm/sec
		Acceleration	0.5mm
		Switch Actuation	0.6N (60gf)

		Switch Life	Button - 3,000,000 Wheel - 1,000,000 times Tilt switch - 500,000 times
		Cable Length	1850mm
		PC98-99	PC99 compliant
	Regulatory Approvals	UL60950-1, UL 94, UL 746 (A-E), UL 796 TUV/GS: EN 60950-1, EN 60825-1 FCC Class B, UL 1950, cUL, TUV GS, CE, C-tick, VCCI, BSMI, RRL	
HP PS/2 Optical Scroll Mouse	Dimensions (H x L x W)	3.95 x 6.21 x 11.7 cm (1.56 x 2.44 x 4.61 in)	
	Weight	4.44 oz (126 g)	
	Environmental	Operating temperature	-32° to 104°F (0° to 40° C)
		Non-operating temperature	-4° to 140°F (-20° to 60° C)
		Operating humidity	10% to 90% (non condensing at ambient)
		Non-operating humidity	10% to 90% non condensing
		Operating shock	40 g, 6 surfaces
		Non-operating shock	80 g, 6 surfaces
		Operating vibration	2 g peak acceleration
		Non-operating vibration	4 g peak acceleration
		Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
	Electrical	Operating voltage	5 VDC ± 10%
		Power consumption	100mA
		System consumption	PS/2 mini-din connector
		ESD	CE level 4, 15 kV air discharge
		EMI-RFI	Conforms to FCC rules for a Class B computing device
		Microsoft PC99 - 2001	Functionally compliant
	Mechanical	Resolution	400 ± 20% DPI
		Tracking speed	10 in/s (25.4 cm/s) maximum
		Acceleration	100 in/s/s (2.54 m/s/s)
		Switch actuation	61 g nominal peak force
		Switch life	3,000,000 operations (using Hasco modified tester)
		Switch type	Low force micro-switches
		Tracking mechanism life	155 mi (250 km) at average speed of 10 in/s
		Cable length	6 ft (1.8 m)
		Microsoft PC99 - 2001	Mechanically compliant
	Scroll wheel	Width	8 mm
		Diameter	1.01 in (25.6 mm)
		Maximum rotation speed	48 rats/sec

		Switch type	Light force micro-switch
		Switch life	1 million operations
		Mechanical life	Minimum 200,000 revolutions
	Regulatory approvals	Compliant	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC
HP USB Optical Scroll Mouse	Dimensions (H x L x W)		1.5 x 4.5 x 2.5 in (3.8 x 11.6 x 6.3 cm)
	Weight		0.27 lb (0.12 kg)
	Cable length		72.8 in (185 cm)

Technical Specifications - Optical Storage

HP SATA Blu-ray Writer	Height	5.25-inch, half-height, tray-load		
	Orientation	Either horizontal or vertical		
	Interface type	SATA/ATAPI		
	Disc capacity	50 GB DL or 25 GB standard		
	Dimensions (W x H x D)	5.9 x 1.7 x 7.5 in (15.0 x 4.4 x 19.0 cm)		
	Weight (max)	2.0 lb (907g)		
			Single-layer	Double-layer
	Write speed	BD-R	2x, 4x CLV, 6x CAV	2x, 4x CLV
		BD-RE	2.3x	2x CLV
		DVD-R	2x, 4x CLV, 8x ZCLV, 8x, 12x PCAV, 16x CAV	2x, 4x CLV
		DVD-RW	1x, 2x, 4x, 6x CLV	Not supported
		DVD+R	2.4x, 4x CLV, 8x ZCLV, 8x, 12x PCAV, 16x CAV	2.4x, 4x CLV
		DVD+RW	2.4x, 4x, 6x CLV, 8x ZCLV	Not supported
		DVD-RAM	2x, 3x CLV, 3-5x PCAV	
		CD-R	8x,16x CLV, 24x, 32x PCAV, 40x CAV	
		CD-RW	4x, 10x, 16x CLV, 24x ZCLV	
			Single-layer	Double-layer
	Read speeds	BD-ROM	6x CAV	4.8x CAV
		BD-R	6x CAV	4.8x CAV
		BD-RE (SL/DL)	4.8x CAV	4.8x CAV
		DVD-ROM	16x CAV	8x CAV
		DVD-R	12x CAV	8x CAV
		DVD-RW	10x CAV	Not support
		DVD+R	12x CAV	8x CAV
		DVD+RW	10x CAV	Not support
		BDMV (AACS Compliant Disc)	4.8x CAV	
		DVD-RAM	2x, 3x CLV, 3x-5x PCAV	
		DVD-Video (CSS Compliant Disc)	8x CAV	
		CD-R/RW/ROM	40x / 40x / 40x CAV	
		CD-DA (DAE)	32x CAV	
		80 mm CD	16x CAV	
	Sustained Transfer rate	BD-ROM	215.79 Mbits/s (6x) max.	
		DVD-ROM	16.62 Mbytes/s (16x) max.	
		CD-ROM	6,000 KB/s (40x) max.	
	Burst Transfer rate		1.5Gbps bits/s (10b side) 1.2Gbps bits/s (8b side)	

Technical Specifications - Optical Storage

	Multimedia MPC-3 compliant		Yes
	Access times (typical reads, including setting)	Random	DVD: < 140 ms (typical), CD: < 125 ms (typical)
		Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)
	Power	Source	SATA DC power receptacle
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC -1000 mA typical, 1600 mA maximum 12 VDC -600 mA typical, 1400 mA maximum
	Environmental (all conditions non-condensing)	Temperature (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 90%
		Maximum Wet Bulb Temperature (operating)	86° F (30° C)
HP SATA SuperMulti LightScribe DVD Writer Drive	Height		5.25-inch, half-height, tray-load
	Orientation		Either horizontal or vertical
	Interface type		SATA/ATAPI
	Disc capacity		8.5 GB DL or 4.7 GB standard
	Dimensions (W x H x D)		5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)
	Weight (max)		2.6 lb (1.2 kg)
	Write speeds	DVD-RAM	Up to 12X
		DVD+R	Up to 16X
		DVD+RW	Up to 8X
		DVD+R DL	Up to 12X
		DVD-R DL	Up to 12X
		DVD-R	Up to 16X
		DVD-RW	Up to 6X
		CD-R	Up to 40X
		CD-RW	Up to 32X
	Read speeds	DVD-RAM	Up to 12X
		DVD+RW, DVD-RW	Up to 8X
		DVD+R DL, DVD-R DL	Up to 12X
		DVD-ROM DL	Up to 8X
		DVD-ROM, DVD+R, DVD-R	Up to 16X
		CD-ROM, CD-R	Up to 40X
		CD-RW	Up to 32X
	Access time (typical reads, including settling)	Random	DVD: < 140 ms (typical), CD: < 125 ms (typical)
		Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)
		Cache Buffer	2 MB (minimum)

Technical Specifications - Optical Storage

	Power	Source	SATA DC power receptacle
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
			12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
			12 VDC (< 600 mA typical, 1400 mA maximum)
	Environmental conditions (operating - non-condensing)	Temperature	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 90%
		Maximum Wet Bulb Temperature	86° F (30° C)

SATA DVD-ROM Drive	Height	5.25-inch, half-height, tray-load		
	Orientation	Either horizontal or vertical		
	Interface type	SATA/ATAPI		
	Disc capacity	Single layer: Up to 4.7 GB (6 times capacity of CD-ROM) Double layer: Up to 8.5 GB (12 times capacity of CD-ROM)		
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)		
	Weight (max)	2.6 lb (1.2 kg)		
	Read speeds	DVD+R/-R/+RW/ -RW/+R DL /-R DL	Up to 8X	
		DVD-ROM	Up to 16X	
		DVD-RAM	Up to 5X	
		CD-ROM, CD-R	Up to 40X	
		CD-RW	Up to 32X	
	Removable Storage – Media Compatibility – DVD-ROM	Media	Read	Write
		CD-ROM	Yes	No
		CD-R	Yes	No
		CD-RW	Yes	No
		DVD-ROM	Yes	No
		DVD-ROM DL	Yes	No
		DVD-RAM	Yes	No
		DVD+R	Yes	No
		DVD+R DL	Yes	No
		DVD+RW	Yes	No
		DVD-R	Yes	No
		DVD-RW	Yes	No
		DVD-R DL	Yes	No
	Access times (typical reads, including setting)	Random	DVD: < 140 ms (typical), CD: < 125 ms (typical)	
		Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)	

	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)
Power	Source	SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC -< 600 mA typical, < 1400 mA maximum
Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 90%
	Maximum Wet Bulb Temperature	86° F (30° C)

HP 22-in-1 (with 1394) Media Card Reader	USB Interface	USB 2.0 High-speed interface NOTE: Requires the USB cable to be connected to the internal USB 2.0 port or a USB 2.0 PCI card.
	1394 Interface	Two IEEE-1394a external ports; 1 IEEE-1394a internal port (connects to the pass through cable on the media card reader)
	Advance protocol support	• Supports hardware ECC (Error Correction Code) function • Supports hardware CRC (Cyclic Redundancy Check) function • Supports MS 4-bit parallel transfer mode • Supports MS-PRO 4-bit parallel transfer mode • Supports MS PRO-HG Duo 4-bit parallel transfer mode • Supports SD 4-bit parallel transfer mode • Supports high-speed 50Mhz SD 4-bit card (version 2.0) • Supports high-speed 52Mhz MMC 8-bit card (version 4.2) • Supports CF v4.0 with PIO mode 6 and Ultra DMA mode
	Supported media type	• CompactFlash Type I • CompactFlash Type II • Microdrive • MultiMediaCard (MMC) • Reduced Size MultiMediaCard (RS MMC) • MultiMediaCard 4.2 (MMC Plus, including MMC Plus HC) • Reduced Size MultiMediaCard 4.2 (MMC Mobile, including MMC Mobile HC) • Secure Digital Card (SD) • Secure Digital High Capacity (SDHC) • miniSD • miniSD High Capacity • Micro SD (T-Flash) • Micro SD HC • Memory Stick • Memory Stick Select • Memory Stick Duo (MS Duo) • Memory Stick PRO (MS PRO) • Memory Stick PRO Duo (MS PRO Duo) • Memory Stick PRO-HG Duo • MagicGate Memory Stick (MG) • MagicGate Memory Stick Duo • xD-Picture Card
	Supported media type with card adapter	• Memory Stick Micro (M2) • MMC Micro
	Environmental	Operational Environmental Extremes: Test Parameters/Conditions - Power applied, unit operating on system ±5% nominal supply voltage. 10°C 10% R.H. = 24 hours 10°C 90% R.H. = 24 hours 20°C 90% R.H. = 24 hours 30°C 90% R.H. = 24 hours 40°C 90% R.H. = 24 hours 50°C 90% R.H. = 24 hours

		50°C 10% R.H. = 24 hours
	Storage Environmental Extremes	Test Parameters/Conditions 140°F (60°C) @ 80% R.H. for 96 hours -22°F (-30°C) @ 20% R.H. for 48 hours No power applied Delta °C < 1.0°C/min Delta % R.H. < 1.5% R.H./min
Approvals		USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0, Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3 FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUV-T

Microtower

Eco-Label Certifications and declarations

This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- US Energy Star
- IT ECO declaration
- EPEAT – Gold

System Configuration

The configuration used for the Energy Consumption and Declared Noise Emissions data for the Microtower model is based on a typically configured product.

Energy Consumption	115 VAC	230 VAC	100 VAC
Normal Operation	31.3720 W	32.1179 W	31.8169 W
Sleep (Energy Star low power mode)	2.4746 W	2.6361 W	2.4347 W
Off	0.7153 W	0.8560 W	0.6980 W

Heat Dissipation*	115 VAC	230 VAC	100 VAC
Normal Operation	107 BTU/hr	110 BTU/hr	109 BTU/hr
Sleep	8 BTU/hr	9 BTU/hr	8 BTU/hr
Off	2 BTU/hr	3 BTU/hr	2 BTU/hr

* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Declared Noise Emissions
(in accordance with ISO 7779 and ISO 9296)

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.8	27
Fixed Disk (random writes)	3.8	28

Batteries

This battery(s) in this product comply with EU Directive 2006/66/EC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight

Battery size: CR2032 (coin cell)
Battery type: Li Ion

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2002/95/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and

ISO1043.

- This product contains 0% post consumer recycled plastic (by wt.)
- This product is 91.4% recyclable when properly disposed of at end of life.

Packaging Materials		
	External	
	Corrugated Paper	1835 g
	Internal	
	Polyethylene low density solid	150 g
	Polyethylene low density foam	20 g

- The Polyethylene low density foam packaging material is made from 100% recycled content.
- The Polyethylene low density Solid packaging material is made from 100% recycled content.
- The corrugated packaging material contains at least 30% recycled content.

Small Form Factor

Eco-Label Certifications & **declarations** This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- US Energy Star
- IT ECO declaration
- EPEAT – Gold

System Configuration The configuration used for the Energy Consumption and Declared Noise Emissions data for the Small Form Factor model is based on a typically configured product.

Energy Consumption	115 VAC	230 VAC	100 VAC
Normal Operation	27.4159 W	27.1680 W	27.7080 W
Sleep (Energy Star low power mode)	2.5527 W	2.7644 W	2.5316 W
Off	0.7149 W	0.8667 W	0.7003 W
Heat Dissipation*	**115 VAC**	**230 VAC**	**100 VAC**
Normal Operation	94 BTU/hr	93 BTU/hr	95 BTU/hr
Sleep	9 BTU/hr	9 BTU/hr	9 BTU/hr
Off	2 BTU/hr	3 BTU/hr	2 BTU/hr

* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Declared Noise Emissions
(in accordance with ISO 7779 and ISO 9296)

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.8	27
Fixed Disk (random writes)	3.9	28

Technical Specifications - Environmental Data

Batteries

This battery(s) in this product comply with EU Directive 2006/66/EC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight

Battery size: CR2032 (coin cell)
Battery type: Li Ion

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2002/95/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 0% post consumer recycled plastic (by wt.)
- This product is 95.1% recyclable when properly disposed of at end of life.

Packaging Materials

External	
Corrugated Carton	1705 g
Internal	
EPE-Expanded Polyethylene	198 g
Polyethylene low density foam	39 g

- The EPE-Expanded Polyethylene packaging material is made from 100% recycled content.
- The Polyethylene low density foam packaging material is made from 100% recycled content.
- The Corrugated Carton packaging materials contains at least 75% recycled content.

Ultra-Slim Desktop

Eco-Label Certifications & **declarations**

This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- US Energy Star
- IT ECO declaration
- EPEAT Gold where HP registers commercial desktop products. See http://www.epeat.net for registration status in your country.

System Configuration

The configuration used for the Energy Consumption and Declared Noise Emissions data for the Ultra-slim Desktop model is based on a typically configured product

Technical Specifications - Environmental Data

Energy Consumption	115 VAC	230 VAC	100 VAC
Normal Operation	22.01 W	22.56 W	23.13 W
Sleep (Energy Star low power mode)	3.03 W	3.07 W	3.04 W
Off	0.92 W	0.96 W	0.91 W
Heat Dissipation*	**115 VAC**	**230 VAC**	**100 VAC**
Normal Operation	75 BTU/hr	77 BTU/hr	79 BTU/hr
Sleep	10 BTU/hr	10 BTU/hr	10 BTU/hr
Off	3 BTU/hr	3 BTU/hr	3 BTU/hr

* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Declared Noise Emissions
(in accordance with
ISO 7779 and ISO 9296)

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.9	29
Fixed Disk (random writes)	3.9	29

Batteries

This battery(s) in this product comply with EU Directive 2006/66/EC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight

Battery size: BR2032 (coin cell)
Battery type: Lithium

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2002/95/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 5.6% post consumer recycled plastic (by wt.)
- This product is 95% recyclable when properly disposed of at end of life.

Packaging Materials

External	
Corrugated Carton	958 g
Corrugated	465 g
Internal	
Polyethylene low density foam	30 g
Molded Pulp	250 g

- The Corrugated Carton packaging material is made from 31% recycled content.
- The Corrugated packaging material is made from 100% recycled content.
- The Polyethylene low density foam packaging material is made from 31% recycled content.
- The Molded Pulp packaging material is made from 100% recycled content.

Microtower, Small Form Factor, and Ultra-Slim Desktop

RoHS Compliance

Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis. By July 1, 2006, RoHS substances will be virtually eliminated (virtually = to levels below legal limits) for all HP electronic products subject to the RoHS Directive, except where it is widely recognized that there is no technically feasible alternative (as indicated by an exemption under the EU RoHS Directive).

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Nickel finishes that release greater than 0.5 micro-grams/cm ^ 2/week, measured according to EN 1811:1998, are not used on any product surface designed to be frequently handled or touched by users.

Packaging

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.

- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-of-life Management and Recycling	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.
Hewlett-Packard Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html

Copyright © 2010 Hewlett-Packard Development Company, L.P.

All rights reserved. Microsoft, Windows, Windows Vista, and Windows 7 are registered trademarks or trademarks of Microsoft Corporation in the U.S. and/or other countries. Phenom, Athlon and Sempron are registered trademarks or trademarks of AMD Corporation in the U.S. and/or other countries. All other product names mentioned herein may be trademarks of their respective companies.

The information contained herein is subject to change without notice and is provided "as is" without warranty of any kind. The warranties for HP products are set forth in the express limited warranty statements accompanying such products. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.